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In re Application of: SEUNG-CHEOL HONG *et al.*

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Filed:	31 August 2001	Art Unit:	2181

For: REDUCING POWER CONSUMPTION IN MONITOR BY SWITCHING OFF HEATER POWER IN POWER-OFF MODE

TRANSMITTAL OF
CERTIFIED COPY OF ENGLISH TRANSLATIONS

Commissioner for Patents
Washington, D.C. 20231

Sir:

This transmittal accompanies certified copies of English translations of the Korean priority document Serial Nos. 6135/1996 and 4299/1996 both filed in the Korean Industrial Property Office on 8 March 1996.

Respectfully submitted,

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I.D.: REB/kf

I, the undersigned, who have prepared English translation which is attached herewith, hereby declare that the aforementioned translation is true and correct translation of officially certified copy of the Korean Patent Application No. 1996-6135 filed on March 8, 1996.

September 24, 2002

Translator : YuJung Choi

Yu-Jung Choi

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This is to certify that annexed hereto is a true copy from the records of the Korean Industrial Property Office of the following application as filed.

Application Number : Patent Application No. 1996-6135

Date of Application : March 8, 1996

Applicant(s) : Samsung Electronics Co., Ltd.

January 16, 1997

COMMISSIONER

[Specification]

[Title of the Invention]

POWER MANAGEMENT APPARATUS FOR MONITOR

[Brief Description of the Drawings]

FIG. 1 is a configuration diagram of a conventional power management apparatus for monitors;

FIG. 2 is a configuration diagram of a power management apparatus for monitors according to the present invention; and

FIG. 3 is a configuration diagram of a heater switching circuit of Fig. 2.

*Explanation of the signs that are the main part of the drawings

10 : DC input part	11 : regulator
12 : transformer	13 : CDT
15 : feedback circuit	18 : MICOM
30 : heater switching circuit	

[Detailed Description of the Invention]

[Object of the Invention]

[Field of the Invention and Prior Art related to the Invention]

The present invention relates to a power management apparatus for monitors that controls power of a monitor based on DPMS (Display Power Management System), and particularly to a power management apparatus for monitors that controls to reduce power consumption of a monitor when a

user stops using a computer for a predetermined time or more.

Generally, with respect to a monitor connected to a computer, when a user stops using the computer and thus horizontal and vertical synchronization signals are not supplied from the computer, consumption of unnecessary power is prevented by sharply reducing a voltage applied to a heater of CDT.

As illustrated in Fig. 1, a conventional power management apparatus for monitors comprises a DC (direct current) input part 10, a regulator 11, a transformer 12, a CDT 13, a feedback control circuit 14, a feedback circuit 15, a regulator driving power supply circuit 16, a MICOM power supply circuit 17, and a MICOM 18. The DC input part 10 provides a DC power to the regulator 11. The regulator 11 receives the DC power from the DC input part 10 and maintains a constant voltage of the DC power according to a current amount applied through the feedback circuit 15 so as to produce the DC power to the transformer 12. The transformer 12 receives the power from the regulator 11 and transfers. The CDT 13 receives a CDT heater voltage from the transformer 12. Thus, heat is generated at a heater coil to heat up a cathode of the CDT 13.

At this time, some electronic beam is generated according to a strength of an image signal applied to the cathode. The electronic beam of the cathode is attracted to a very high anode voltage applied to an anode grid and proceeds to a plate.

The accelerated electronic beam passes through the plate and collides with fluorescent materials coated on a surface of the CDT 13. As a result, an energy of the electronic beam is emitted as light, and this enables a display operation of information.

In the case that horizontal and vertical synchronization signals are not supplied from the computer PC, the MICOM 18 outputs an off mode signal PS to the feedback control circuit 14. Also, the feedback control

circuit 14 sharply decreases an output from a secondary part of the transformer 12 according to the off mode signal supplied from the MICOM 18, thereby reducing the CDT heater voltage provided from the transformer 12 to the CDT 13. When the transformer 12 decreases an output of the CDT heater voltage (that is, in off mode), the regulator driving power supply circuit 16 controls a power supplied from the transformer 12 and provides the power as a driving power to the regulator 11. When the transformer 12 decreases an output of the CDT heater voltage (that is, in the off mode), the MICOM power supply circuit 17 controls the power supplied from the transformer 12 and provides as a driving power to the MICOM 18.

In the foregoing conventional power management apparatus for monitors, when the MICOM 18 does not receive horizontal and vertical synchronization signals from a computer PC and operates a monitor in off mode, the MICOM 18 outputs an off mode control signal to the feedback control circuit 14, thereby cutting off an output from a secondary part of the transformer 12 by the feedback control circuit 14. At this time, a voltage from a secondary part of the transformer 12 is reduced. Accordingly, to normally operate the regulator 11 and the MICOM 18, the power should be provided using a regulator driving power supply circuit 16 and a MICOM power supply circuit 17.

As described above, the conventional power management apparatus uses a regulator driving power supply circuit 16 and a MICOM power supply circuit 17 in order to operate a monitor in off mode. For this reason, manufacturing costs of circuits are increased, and because DPMS is driven to operate together with a transformer 12, it is difficult to form a circuit and reliability of operation is lowered.

[Technical Object of the Invention]

The present invention is directed at solving the foregoing problem. It

is therefore an object of the present invention to provide a power management apparatus for monitors that enables DPMS to perform its function with a simplified circuit configuration in order to reduce manufacturing costs of circuits and to improve reliability of operation.

The object of the present invention can be achieved by a power management apparatus for monitors comprising a regulator for receiving a DC power from a DC input part and maintaining a constant voltage of the DC power to output the power to a transformer; a CDT for receiving a CDT heater voltage to display information; and a MICOM for outputting an off mode control signal when horizontal and vertical synchronization signals are not supplied from a computer for a predetermined time. The power management apparatus for monitors further comprises a heater switching circuit for switching the CDT heater voltage supplied from the transformer to the CDT according to the off mode control signal supplied from the MICOM.

The heater switching circuit includes a first transistor operated on and off depending on whether or not an off mode control signal is supplied from the MICOM; a second transistor operated on and off according to an operation of the first transistor; and a third transistor operated on and off according to the second transistor to switch a CDT heater voltage supplied from the transformer to the CDT.

(Embodiment)

The present invention will now be described more fully hereinafter with reference to Figs. 2 and 3.

As illustrated in Fig. 2, a power management apparatus for monitors according to the present invention comprises a DC input part 10, a regulator 11, a transformer 12, a CDT 13, a feedback circuit 15, a MICOM 18, and a heater switch circuit 30. The DC input part 10 provides a DC power to the

regulator. The regulator 11 receives the DC power from the DC input part 10 and maintains a constant voltage of the DC power according to a current amount applied through the feedback circuit 15 to output the power to the transformer 12. The transformer 12 receives the power from the regulator 11 and transfers the power to the heater switching circuit 30. The heater switching circuit 30 switches a CDT heater voltage supplied from the transformer 12 to the CDT 13 according to an off mode control signal PS2 supplied from the MICOM 18. The CDT 13 receives a CDT heater voltage supplied from the transformer 12 through the heater switching circuit 30 and performs a display operation of information. When horizontal and vertical synchronization signals are not supplied from a computer PC, the MICOM 18 outputs the off mode control signal PS2 to the heater switching circuit 30, thereby preventing a CDT heater voltage provided from the transformer 12 to the CDT 13. Also, in the case that a monitor enters to off mode, the regulator 11 and the MICOM 18 receive the power directly from the transformer 12 and are operated.

Meanwhile, as illustrated in Fig. 3, the heater switching circuit 30 is formed of a plurality of transistors Q1-Q3 and a plurality of resistors R1-R5 which are coupled with each other, and switches the CDT heater voltage provided from the transformer 13 to the CDT 13 depending on whether or not the off mode control signal is inputted from the MICOM 18. The MICOM 18 produces an off mode control signal PS2 to the base terminal of the transistor Q3 if horizontal and vertical synchronization signals are not applied for a predetermined time. The transistor Q3 is turned off when the off mode control signal PS2 is applied to the base terminal such that a current flows to a collector to turn off the transistor Q2. If the transistor Q2 is turned off, the transistor Q1 is turned off to cut off a CDT heater voltage supplied from the transformer 12 to the CDT 13.

The power management apparatus for monitors with the foregoing

configuration according to the present invention is operated as follows.

To begin with, while a user uses a computer PC, the computer PC normally applies horizontal and vertical synchronization signals to the MICOM 18. At this time, the MICOM 18 does not produce an off mode control signal PS2 to a heater switching circuit 30. Thus, because the off mode control signal PS2 is not applied to the base terminal of a transistor Q3, the transistor Q3 is turned off. As a result, a voltage B+ is applied to the base terminal of a transistor Q2, thereby turning on the transistor Q2. Further, as the transistor Q2 is turned on, a transistor Q1 is also turned on. Therefore, the transistor Q1 transfers a CDT heater voltage supplied from the transformer 12 to CDT 13 so as to normally operate the CDT 13.

Meanwhile, in the state that the CDT heater voltage produced from the transformer 12 is supplied to the CDT 13 by the heater switching circuit 30, if a user stops using a computer PC and thus the computer PC does not apply horizontal and vertical synchronization signals to the MICOM 18 for a predetermined time, the MICOM 18 produces an off mode control signal PS2 to the heater switching circuit 30. Thus, an off mode control signal PS2 is applied to the base terminal of a transistor Q3, thereby turning on the transistor Q3. As the transistor Q3 is turned on, a voltage B+ is not applied to the base terminal of a transistor Q2 such that a transistor Q2 is turned off. Also, as the transistor Q2 is turned off, a transistor Q1 is switched into an off state. As a result, because the transistor Q1 cuts off a CDT heater voltage supplied from the transformer 12 to the CDT 13 so as not to operate the CDT 13, thereby reducing power consumption. In the event that a monitor enters to off mode, a regulator 11 and a MICOM 13 receive the power directly from the transformer and are operated.

[Effect of the Invention]

As explained above, in the present invention, it is unnecessary to use

an additional power supply circuit for providing an operating power to a regulator 11 and a MICOM 18 in case of operating a monitor in off mode. In addition, because DPMS is driven to perform its function not even operating with a transformer 12, manufacturing costs of circuits are reduced and reliability of operation is improved.

[Scope of the Claim]

[Claim 1]

A power management apparatus comprising:

a regulator for receiving a DC power from a DC input part and maintaining a constant voltage of the DC power to produce the power to a transformer;

a CDT for receiving the applied CDT heater voltage to display information; and

control signal generating means for producing an off mode control signal when horizontal and vertical synchronization signals are not supplied from a computer for a predetermined time, further comprising a heater switching circuit for switching the CDT heater voltage supplied from the transformer to the CDT according to an off mode control signal supplied from the control signal generating means.

[Claim 2]

The power management apparatus for monitors as defined in Claim 1, wherein the heater switching circuit includes:

a first transistor operated on and off depending on whether or not the off mode control signal is applied ;

a second transistor operated on and off according to an operation of the first transistor;

a third transistor operated on and off according to an operation of the second transistor to switch the CDT heater voltage supplied from the transformer to the CDT.

[Abstract of the Disclosure]

[Abstract]

The present invention relates to a power management apparatus for monitors that manages power of a monitor based on DPMS (Display Power Management System), and particularly to a power management apparatus for monitors that manages to reduce power consumption of a monitor when a user stops using a computer.

Because a conventional power management apparatus adopts a regulator driving power supply circuit 16 and a MICOM power supply circuit 17 in order to operate a monitor in off mode, manufacturing costs of circuits are increased. Also, when DPMS is driven, a transformer 12 is operated together with the DPMS. Thus, it is difficult to form circuits and reliability of operation is lowered.

In the present invention, when a monitor enters to off mode, it is unnecessary to use an additional power supply circuit for providing an operating power to a regulator 11 and to a MICOM 18. Because DPMS is driven for performing its function not even operating with the transformer 12, it is possible to shorten manufacturing costs of circuits and improve reliability of operation.

Fig. 1

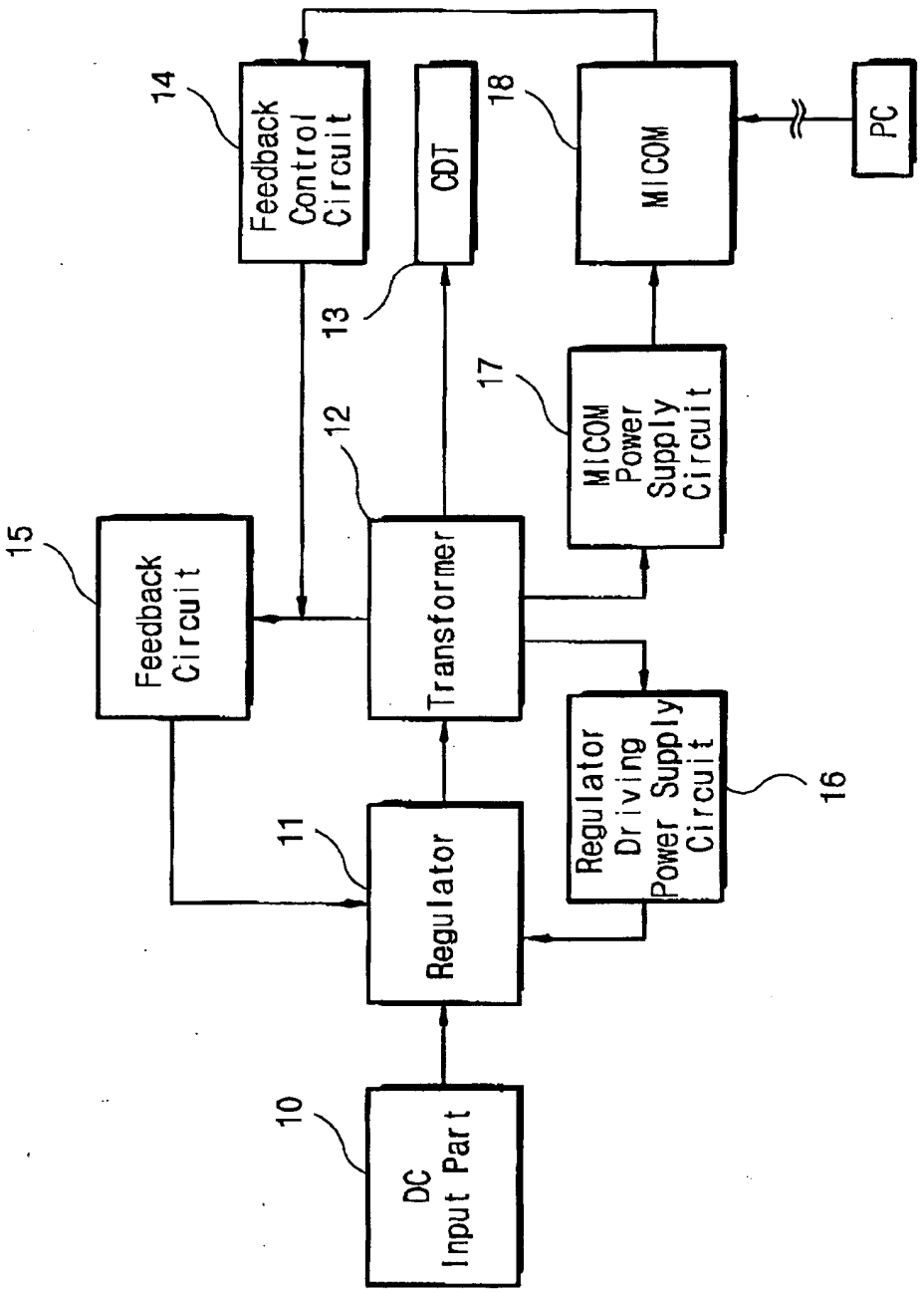


Fig. 2

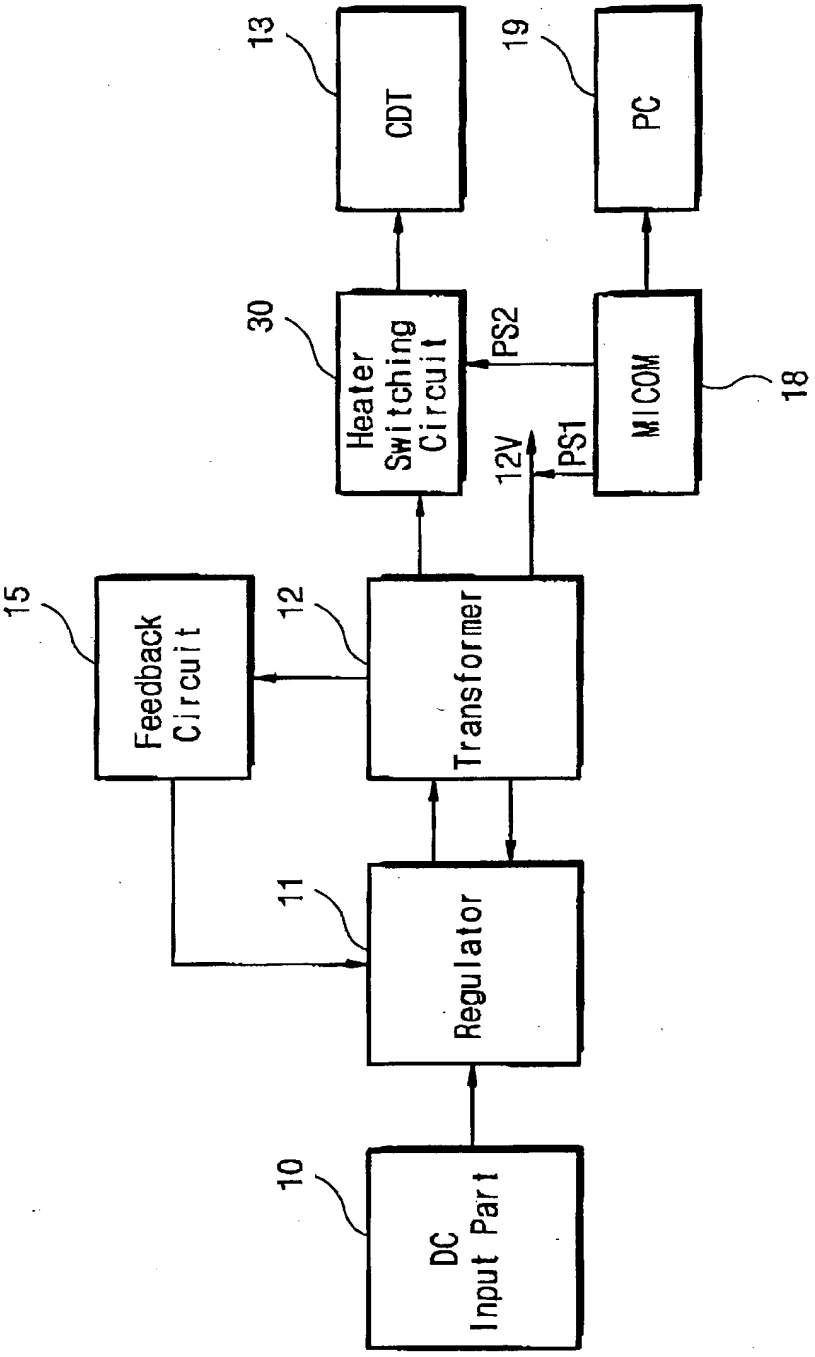
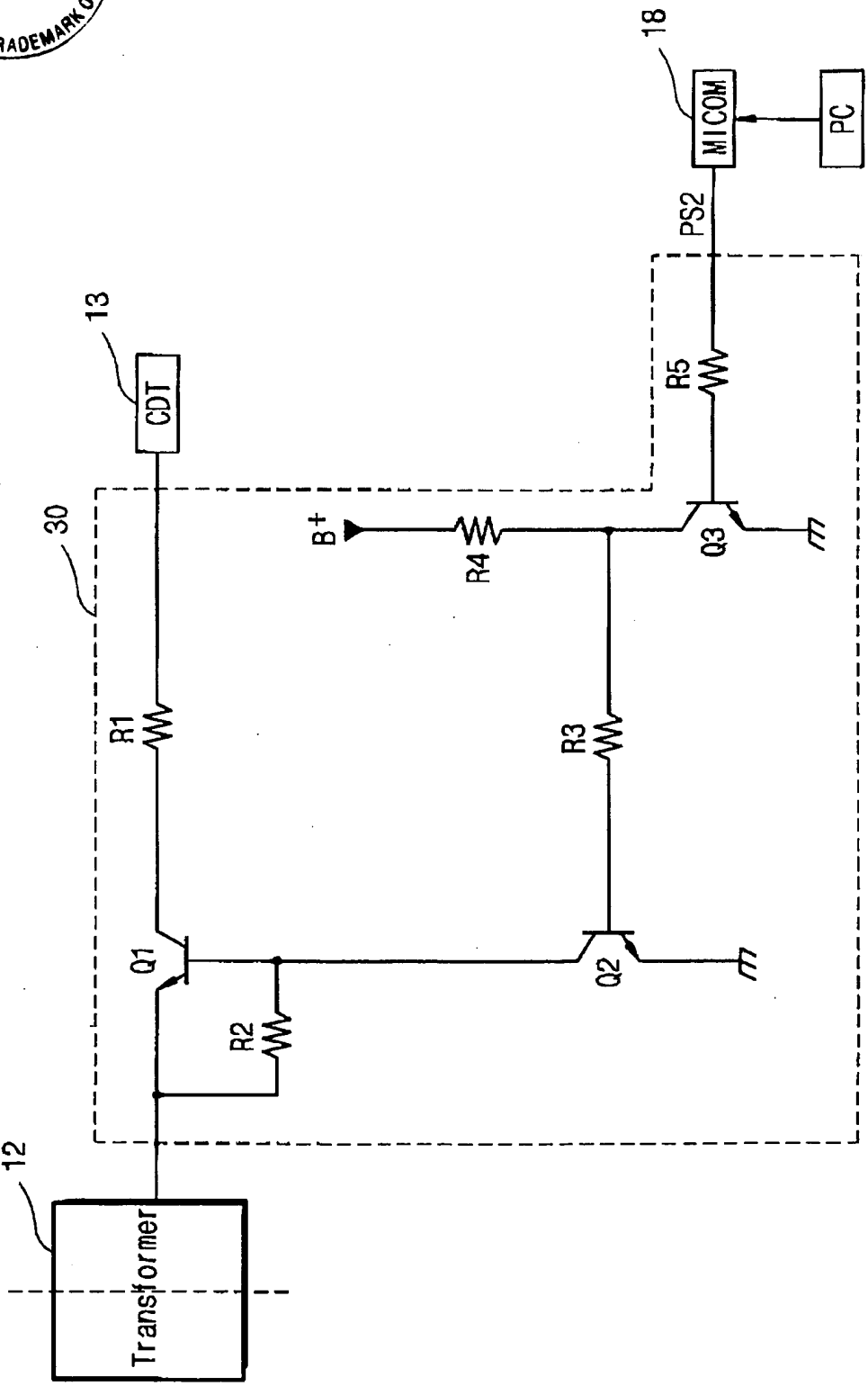


Fig. 3



I, the undersigned, who have prepared English translation which is attached herewith, hereby declare that the aforementioned translation is true and correct translation of officially certified copy of the Korean Patent Application No. 1996-4299 filed on March 8, 1996.

September 24, 2002

Translator : YuJung Choi

Yu-Jung Choi

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This is to certify that annexed hereto is a true copy from the records of the Korean Industrial Property Office of the following application as filed.

Application Number : Patent Application No. 1996-4299

Date of Application : March 8, 1996

Applicant(s) : Samsung Electronics Co., Ltd.

January 16, 1997

COMMISSIONER

[Specification]

[Title of the Invention]

OFF MODE INDICATING CONTROL CIRCUIT FOR MONITOR

[Brief Description of the Drawings]

Fig. 1 is a configuration diagram of a mode indicating circuit included in a conventional monitor;

Fig. 2 is a configuration circuit of a monitor according to the present invention; and

Fig. 3 is a circuit diagram of a mode indicating circuit and an off mode indicating control circuit as illustrated in Fig. 2.

*Explanation of the signs that are the main part of the drawings

100 : signal input part	101 : signal amplification part
200 : CPT	300 : MICOM part
301 : mode indicating circuit	302 : MICOM power supply part
303 : indicating control circuit	400 : power input part
401 : regulator	402 : transformer
403 : heater voltage control part	404 : feedback circuit

[Detailed Description of the Invention]

[Object of the Invention]

[Field of the Invention and Prior Art related to the Invention]

The present invention relates to a monitor for displaying information

supplied from a computer, and particular to an off mode indicating control circuit capable of performing an accurate display operation indicating that a monitor enters to off mode when a power applied to the monitor is controlled in off mode by DPMS (Display Power Management system).

Generally, in a monitor connected to a computer for displaying various information, when the computer is not operated by a user for a predetermined time, the monitor enters to off mode by DPMS and thus reducing power consumption.

In a conventional monitor, in the case that power is managed by DPMS, a state corresponding to each operation mode is shown at a mode indicating circuit. Each mode is indicated by using the mode indicating circuit as illustrated in Fig. 1 to inform a user of each state. Such a mode indicating circuit includes a plurality of resistors R1-R3, a plurality of light emitting diodes (LEDs) PD1 and PD2, a transistor Q1, and a diode D1, which are coupled with each other. The LEDs PD1 and PD2 are driven according to an indicating control signal supplied from a MICOM of the monitor to the base terminal of the transistor Q1 to inform the user of each mode by the LEDs PD1 and PD2. While voltages Vcc1 and Vcc2 are applied to the mode indicating circuit of Fig. 1, the voltage Vcc2 is set to be higher than the voltage Vcc1. Also, according to the indicating control signal of which square wave is different by each mode, the transistor Q1 repeatedly performs on/off operations, and thus the LEDs PD1 and PD2 toggle on and off alternatively to indicate each mode of DPMS. Meanwhile, the LED PD1 emits an orange-colored light while the LED PD2 emits a green-colored light. When the monitor enters to on mode, the LED PD2 is emitted to inform the user of the on mode. When the monitor enters to stand-by mode, the LED PD1 is emitted to inform the user of the stand-by mode. In the case that the monitor enters to suspend mode, both LEDs PD1 and PD2 are emitted, thereby informing the user of the suspend mode. While operating the

monitor in off mode, the user is informed of the off mode by toggling on and off the LED PD1 alternatively.

In the conventional mode indicating circuit as described above, when the monitor where the voltage Vcc2 is not applied is operated in off mode, the transistor Q1 toggles on and off according to the indicating control signal of square wave so as to toggle only the LED PD1. Thus, the monitor can indicate the off mode state. However, when the monitor where the voltage Vcc2 is applied is operated in off mode, the transistor Q1 toggles both the LED PD1 and PD2. Accordingly, the monitor indicates not the off mode but suspend mode.

[Technical Object of the Invention]

The present invention is directed at solving the foregoing problem. It is therefore an object of the present invention to exactly inform a user that when a power applied to a monitor is controlled in off mode by DPMS, the monitor where a voltage Vcc2 is applied to a mode indicating circuit is operated in the off mode.

[Construction and Operation of the Invention]

The object of the present invention can be achieved by an off mode indicating control circuit for monitors. The monitor comprises a signal amplification part for amplifying a signal supplied from a signal input part to provide the amplified signal to CDT; a MICOM for controlling modes of DPMS depending on whether or not there is a signal supplied from the signal input part; a mode indicating circuit receiving an indicating control signal from the MICOM to display a mode state of DPMS; a regulator for maintaining a constant voltage of a power supplied from a power input part according to variations of a current and a voltage supplied from a transformer through a feedback circuit, to output the power to the

transformer; a heater voltage control part for receiving the power from the transformer to generate a voltage for driving a heater of the CDT according to an off mode control signal from the MICOM. The monitor further comprises the off mode indicating control circuit operated according to the off mode control signal supplied from the MICOM, so as to cut off a predetermined voltage applied to the mode indicating circuit in off mode.

(Embodiment)

The present invention will now be described more fully hereinafter with reference to Figs. 2 and 3.

A monitor according to the present invention, as illustrated in Fig. 2, comprises a signal input part 100, a signal amplification part 101, a CDT 200, a MICOM part 300, a mode indicating circuit 301, a MICOM power supply part 302, an indicating control circuit 303, a power input part 400, a regulator 401, a transformer 402, a heater voltage control part 403, and a feedback circuit 404. The signal amplification part 101 amplifies a signal supplied from the signal input part 100 and generates the amplified signal to the CDT 200, and the CDT 200 displays the signal supplied from the signal amplification part 101. The MICOM 300 controls each mode of DPMS depending on whether or not there is the signal supplied from the signal input signal 100, and the mode control circuit 301 receives an indicating control signal from the MICOM 300 and displays each mode state of DPMS. The indicating control circuit 303 cuts off a predetermined voltage applied to the mode indicating circuit 301 in off mode according to an off mode control signal supplied from the MICOM 300. The power input part 400 receives a power for operating the monitor and outputs the power to the regulator 401. The regulator 401 maintains a constant voltage of a power supplied from the power input part 400 according to a variation of a current supplied from the feedback circuit 404, thereby producing the power to the transformer 402.

The transformer 402 outputs a current and a voltage supplied from the regulator 401 to a primary part through a secondary part. The feedback circuit 404 feedbacks variations of the current and the voltage supplied from the transformer 402 to the regulator 401. The heater voltage control part 403 receives the power from the transformer 402 to generate a voltage for driving a heater of the CDT 200 to the CDT 200 according to the off mode control signal supplied from the MICOM 300.

Meanwhile, configurations of the mode indicating circuit 301 and the indicating control circuit 303 are as illustrated in Fig. 3. That is, the mode indicating circuit 301 includes a plurality of resistors R1-R3, a plurality of light emitting diodes (LEDs) PD1 and PD2, and a transistor Q1, which are coupled with each other. The mode indicating circuit 301 drives the LEDs PD1 and PD2 according to an indicating control signal supplied from the MICOM 300 to the base terminal of the transistor Q1 so as to inform a user of each mode state by the LEDs PD1 and PD2. The indicating control circuit 303 is configured with a diode D2, a resistor R4, and a transistor Q2, which are coupled with each other, and cuts off a voltage Vcc2 according to an off mode control signal PS2 supplied from the MICOM 300 in the off mode.

In the event that the MICOM 300 operates the monitor in off mode, an off mode control signal is provided to the heater voltage control part 403 to control the heater voltage control part 403. Thus, a heater voltage provided to the CDT 200 is cut off, thereby operating the CDT 200 in the off mode. At this time, the off mode control signal is applied to the indicating control circuit 303. If the off mode control signal PS2 is supplied from the MICOM 300 to the base terminal, the transistor A2 of the indicating control circuit 303 is operated according to the off mode control signal to connect the voltage Vcc2 to a ground terminal, and thus preventing the voltage Vcc2 from being applied to the transistor Q1 and to the LEDs PD1 and PD2. In the case that the indicating control signal of square wave is supplied from the

MICOM 300 to the base terminal of the transistor Q1, while the indicating control signal is at a high level, the transistor Q1 is turned on. As a result, only the LED PD1 is operated independently of the transistor Q2 to emit an orange-colored light. Conversely, while the indicating control signal is at a low level, the transistor Q1 is turned off and the transistor Q2 is turned on. Thus, the voltage Vcc2 is connected to the ground terminal such that the LEDs PD1 and PD2 maintain off mode and do not emit light. Accordingly, in the case that the MICOM 300 operates the monitor in off mode, the LED PD1 toggles on and off alternatively according to an operation of the transistors Q1 and Q2, thereby informing a user of the off mode state.

[Effect of the Invention]

As explained above, the present invention may exactly inform a user that in the case that a power applied to a monitor is controlled in off mode by DPMS, the monitor where a voltage Vcc2 is applied to a mode indicating circuit is operated in the off mode.

[Scope of the Claim]

[Claim 1]

A monitor comprising:

A signal amplification part 101 for amplifying a signal supplied from a signal input part 100 to generate the amplified signal to CDT 200;

A MICOM 300 for controlling each mode of DPMS depending on whether or not there is a signal supplied from the signal input part 100;

a mode indicating circuit 301 for receiving an indicating control signal from the MICOM 300 to display each mode state of DPMS;

a regulator 401 for maintaining a constant voltage of a power supplied from a power input part 400 according to variations of a current and a voltage supplied from a transformer 402 through a feedback circuit 404 to produce the power to the transformer 402; and

a heater voltage control part 403 for receiving the power from the transformer 402 to generate a voltage for driving a heater of the CDT 200 to the CDT 200 according to an off mode control signal from the MICOM 300, further comprising an off mode indicating control circuit, which is operated according to the off mode control signal from the MICOM 300 so as to cut off a predetermined voltage Vcc2 applied to the mode indicating circuit 301 in the off mode.

[Abstract of the Disclosure]

[Abstract]

The present invention relates to a monitor for displaying information supplied from a computer, and particularly to an off mode indicating control circuit capable of performing an accurate display operation indicating that a monitor enters to off mode when a power applied to the monitor is controlled in off mode by DPMS (Display Power Management system).

With a conventional mode indicating circuit, in a monitor where a voltage Vcc2 is not applied in off mode, a transistor Q1 repeatedly performs on/off operations according to an indicating control signal of square wave. As a result, only light emitting diode (LED) PD1 is toggled such that the monitor enters to the off mode. Unfortunately, however, in a monitor where the voltage Vcc2 is applied in off mode, because the transistor Q1 toggles both LEDs PD1 and PD2 according to the indicating control signal of square wave, the monitor enters to suspend mode, not the off mode.

According to the present invention, a user can be exactly informed that, in a monitor where the voltage Vcc2 is applied to a mode indicating circuit in off mode, when a power applied to the monitor is controlled in off mode by DPMS, the monitor enters to the off mode.

Fig. 1

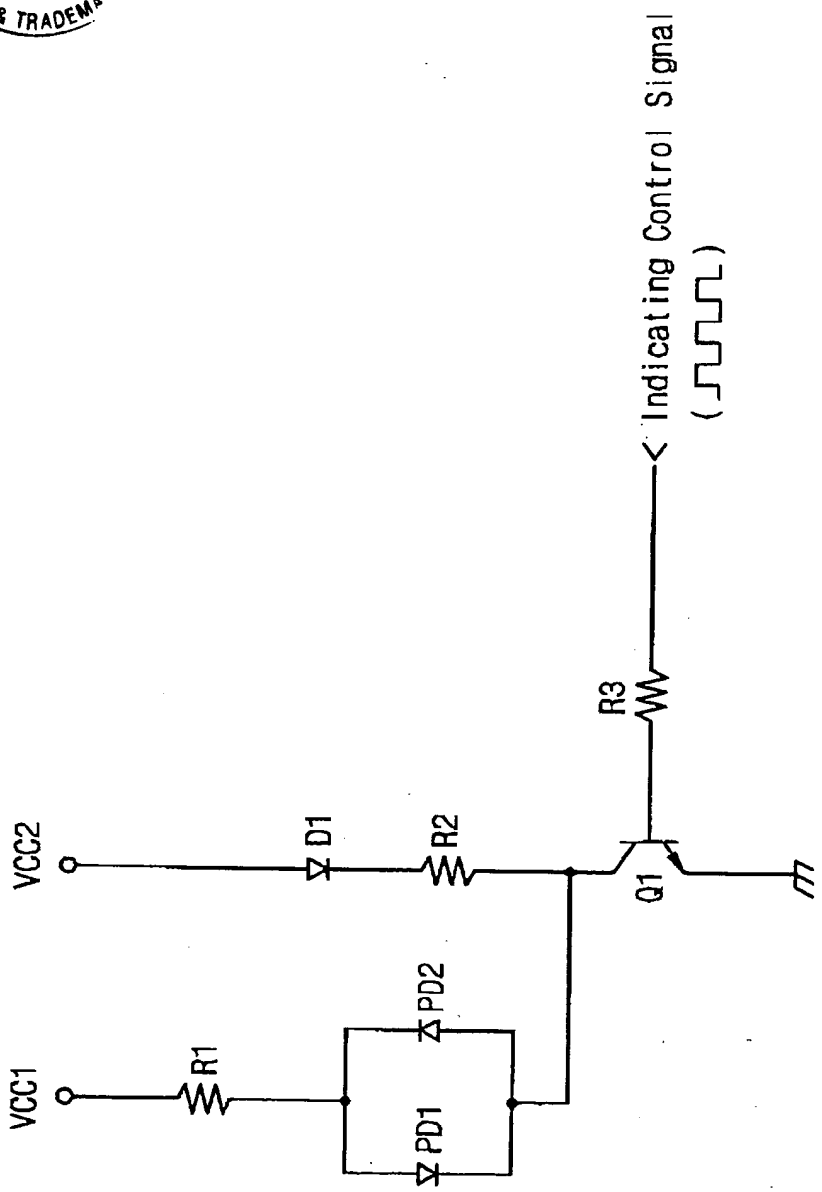

Fig. 2

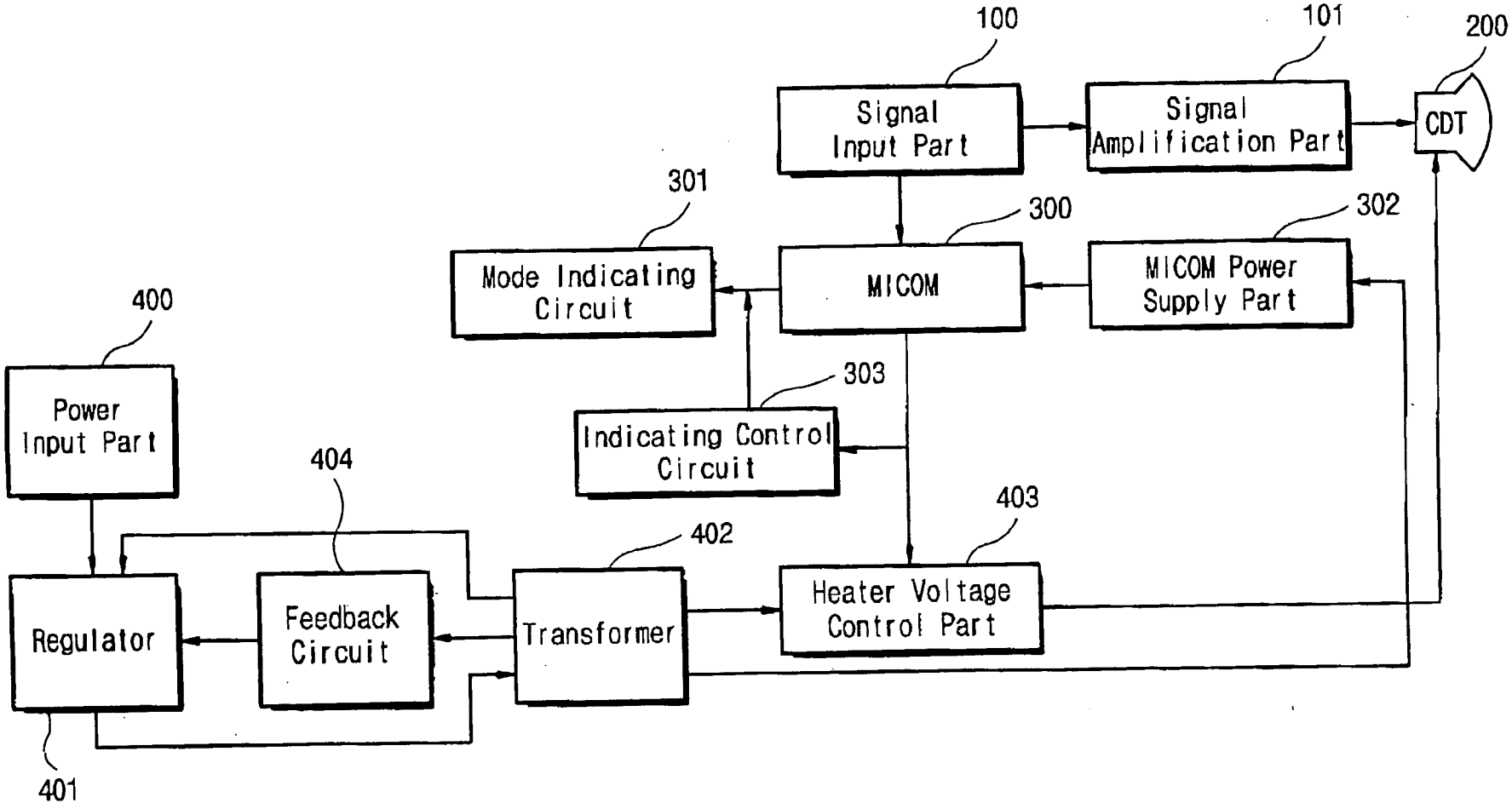

Fig. 3